

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

**AMENDMENTS TO THE CLAIMS**

The following listing of claims supersedes all prior versions and listings of claims in this application:

**LISTING OF CLAIMS:**

1–21. Cancelled

22. (Currently Amended) A method for monitoring the response of a nervous system of a body to a sensory stimulus, said method comprising:

providing a plurality of electrodes on a surface of the body and passing current between selected areas of the surface of the body by passing current between at least one pair of electrodes of said [[set]] plurality of electrodes, said current being provided by a current source external to said body; and

collecting a set of voltage measurements between selected ones of said plurality of electrodes while said current is passing between said at least one pair of electrodes;

wherein the set of voltage measurements is collected over a predetermined measurement period, the predetermined measurement period is initiated after a predetermined delay based upon a neurological model following occurrence of the sensory stimulus, and the collected voltage measurements are compared with reference measurements to determine normal or abnormal response of the nervous system.

23. (Previously Presented) A method according to claim 22, wherein the set of voltage measurements is used to produce an image representing the distribution of impedance within the body.

24. (Previously Presented) A method according to claim 22, wherein:

the sensory stimulus comprises a series of second stimuli,

a set of voltage measurements is collected during current injection periods initiated after application of each second stimulus, the collection of voltage measurements related to each second stimulus is initiated at a time delay relative to the respective second stimulus,

the time delay differs for each second stimulus, and differences between collected sets of voltage measurements are interpreted as representing changes in nervous system activity over the time difference between the respective time delays.

25. (Previously Presented) A method according to claim 24, wherein each set of voltage measurements is used to produce a respectively corresponding image representing the distribution of impedance within the body and the thus produced images are compared with each other to identify changes in nervous system activity.

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

26. (Previously Presented) A method according to claim 22, wherein the applied sensory stimulus is a visual or an auditory stimulus.

27. (Previously Presented) A method according to claim 22, wherein measured voltage measurements are filtered using a Kalman filter.

28. (Previously Presented) A method according to claim 22, further comprising applying the sensory stimulus.

29. (Previously Presented) A method according to claim 22, wherein when application of the sensory stimulus is detected, said detection starts measurement of said predetermined time.

30. (Previously Presented) A method according to claim 29, wherein the sensory stimulus occurs spontaneously.

31. (Previously Presented) A method according to claim 30, wherein the sensory stimulus is a feature of an environment in which the body is located.

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

32. (Currently Amended) A method for monitoring the response of a predetermined part of a nervous system of a body to an applied sensory stimulus, said method comprising:

identifying the predetermined part of the nervous system;  
providing a plurality of electrodes on a surface of the body and passing current between selected areas of the surface of the body by passing current between at least one pair of electrodes of said [[set]] plurality of electrodes, said current being provided by a current source external to said body; and

~~passing current between selected regions of a surface of the body, and~~  
collecting a set of voltage measurements between selected ones of said electrodes while said current is being passed between said at least one pair of electrodes;

wherein the set of voltage measurements is collected over a predetermined measurement period,

the predetermined measurement period is initiated after a predetermined delay following occurrence of the applied sensory stimulus, and said predetermined delay is selected on the basis of a neurological model of the nervous system and the predetermined part of the nervous system for which a response is monitored.

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

33. (Previously Presented) A method according to claim 32, wherein the collected voltage measurements are compared with reference measurements to determine normal or abnormal response of the nervous system.

34. (Previously Presented) A method according to claim 32, wherein the sensory stimulus is a visual or auditory stimulus.

35. (Previously Presented) A method according to claim 32, wherein said regions and/or areas are selected on the basis of a neurological model of the nervous system and the applied sensory stimulus such that sensitivity of the derived impedance measurements to changes in the predetermined part of the nervous system is maximized.

36. (Currently Amended) An apparatus for monitoring the response of a nervous system of a body to an applied sensory stimulus, said apparatus comprising:  
means for applying the sensory stimulus to the body;  
means for collecting a set of voltage measurements between selected ones of said electrodes while said current is being passed between said at least one pair of electrodes, wherein the set of voltage measurements is collected over a predetermined measurement period, the predetermined measurement period is initiated after a

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

predetermined delay based upon a neurological model following occurrence of the sensory stimulus, and

means to compare the collected voltage measurements with reference measurements to determine normal or abnormal response of the nervous system.

37. (Currently Amended) An apparatus for monitoring the response of a predetermined part of a nervous system of a body to an applied sensory stimulus, said apparatus comprising:

a plurality of electrodes for attaching to a surface of the body, said plurality of electrodes being arranged to pass current between selected areas on the surface of the body by passing current between at least one pair of electrodes of said plurality of electrodes, said current being provided by a current source external to said body;

means for applying the sensory stimulus, and

means for collecting a set of voltage measurements between selected ones of said electrodes while said current is being passed between said at least one pair of electrodes,

wherein the set of voltage measurements is collected over a predetermined measurement period, the predetermined measurement period is initiated after a predetermined delay following occurrence of the sensory stimulus, and said predetermined time is selected on the basis of a neurological model of the nervous

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

system and the predetermined part of the nervous system for which a response is monitored.

38. (Currently Amended) A method of diagnosing a brain dysfunction, said method comprising:

providing a plurality of electrodes on a surface of a patient's head and passing current between selected areas of the surface of the body by passing current between at least one pair of electrodes of said plurality of electrodes, said current being provided by a current source external to said body;

applying a sensory stimulus to a patient; and

collecting a set of voltage measurements between selected ones of said electrodes while said current is being passed between said at least one pair of electrodes;

wherein the set of voltage measurements is collected over a predetermined measurement period, the predetermined measurement period is initiated at a predetermined delay based upon a neurological model following occurrence of the sensory stimulus, and the collected voltage measurements are compared with reference measurements to determine normal or abnormal response of the nervous system.

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

39. (Previously Presented) A computer-readable computer program storage medium containing computer program code which, when executed by a computer effects a procedure in accordance with the method of claim 22.

40. (Previously Presented) A computer apparatus comprising:  
a memory storing processor readable instructions;  
a processor for reading and executing instructions from said memory;  
wherein said memory comprises instructions which, when executed, cause the processor to execute the method of claim 22.

41. (Currently Amended) A method for monitoring the response of a nervous system of a body to a sensory stimulus, said method comprising:  
providing a plurality of electrodes on a surface of the body and passing current between selected areas of the surface of the body by passing current between at least one pair of electrodes of said plurality of electrodes, said current being provided by a current source external to said body;  
collecting a set of voltage measurements between selected ones of said electrodes while said current is passed between said at least one pair of electrodes;  
wherein the set of voltage measurements is collected over a predetermined measurement period, user input indicating a time delay is received and the

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

predetermined measurement period is initiated after a predetermined delay based upon the input time delay following occurrence of the sensory stimulus determined by the input time delay, and the collected voltage measurements are compared with reference measurements to determine neurological behavior of the nervous system.

42. (Currently Amended) A method for monitoring the response of a nervous system of a body to a sensory stimulus, said method comprising:

providing a plurality of electrodes on a surface of the body and passing current between selected areas of the surface of the body by passing current between at least one pair of electrodes of said plurality of electrodes, said current being provided by a current source external to said body;

collecting a set of voltage measurements between selected ones of said electrodes while said current is passed between said at least one pair of electrodes,

wherein the set of voltage measurements is collected over a predetermined measurement period, the predetermined measurement period is initiated after a predetermined delay based upon a neurological model following occurrence of the sensory stimulus, and the collected voltage measurements are compared with reference measurements to determine neurological behavior of the nervous system.

Christopher J. D. POMFRETT, *et al.*  
Serial No. 10/553,745  
March 2, 2009

43. (Currently Amended) A method for monitoring nervous system response to a sensory stimulus, said method comprising:

- (a) applying a predetermined sensory stimulus to a nervous system of a living subject;
- (b) after an initial time delay, injecting electrical current through at least a first pair of electrodes affixed to the head of said subject for a first time period;
- (c) during said first time period, sequentially measuring electrical voltage across further pairs of electrodes also affixed to the head of said subject;
- (d) subsequent to said first time period, injecting electrical current through at least another pair of said electrodes for another time period;
- (e) during said another time period, sequentially measuring electrical voltages across other pairs of said electrodes;
- (f) repeating steps (d) and (e) a predetermined number of times;
- (g) creating an image of brain activity in said subject based on said measured electrical voltages; and
- (h) repeating steps (a)-(g) for different initial time delays to derive a time sequence of images revealing nervous system responses to said predetermined sensory stimulus in different parts of the subject's brain.